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REVIEW OF THE CYPRESS AND JUNIPER SAWFLIES OF THE GENUS *SUSANA* ROHWER AND MIDDLETON (HYMENOPTERA: TENTHREDINIDAE)

DAVID R. SMITH

Systematic Entomology Laboratory, PSI, Agricultural Research Service, U.S. Department of Agriculture, % National Museum of Natural History, P.O. Box. 37012, MRC 168, Washington, DC 20013-7012, U.S.A. (e-mail: dsmith@sel.barc.usda.gov)

Abstract.—Species of *Susana* Rohwer and Middleton occur in western North America from British Columbia south to New Mexico, Arizona, and California. Food plants are *Cupressus* spp. and *Juniperus* spp. (Cupressaceae). Ten species are known, including ***S. bakeri,* n. sp.,** from Idaho, and ***S. marin,* n. sp.,** and ***S. diablo,* n. sp.**, from California. The males of *S. oregonensis* Smith and *S. juniperi* (Rohwer) are described for the first time. A key to species is presented, new distributions records are given, and a food plant summary is presented.

Key Words: Susaninae, sawflies, *Cupressus, Juniperus,* British Columbia, Oregon, Idaho, Nevada, California, Utah, Arizona, New Mexico

Species of *Susana* Rohwer and Middleton are restricted to North America, west of the Rocky Mountains, from southern British Columbia south to California, Arizona, and New Mexico (Fig. 1). Their larvae feed on species of *Cupressus* and *Juniperus* (Cupressaceae), and they are occasionally pests of cypress and ornamental juniper, especially in California. It is the only genus placed in the currently recognized subfamily Susaninae, as discussed and defined by Smith (1969).

Since my revision of *Susana* (Smith 1969), one new species from British Columbia has been described (Wong and Milliron 1972), and I have examined additional material from various collections. Also, prompting this review are observations and collections of two species by H. R. Jacobson, in Chico, California. Here, I describe three new species, describe previously unknown males for two species, present a revised key to species, report new distribution and food plant records, and illustrate the lancets and male genitalia for each species.

The most reliable characters for species identification are in the female lancets. Color is helpful, but there is considerable color variation in several species. Males are more difficult, and examination of the genitalia is necessary. However, males have not been associated with all species and thus identification of single males is sometimes doubtful. Characters in the penis valve are most reliable, but it is three dimensional and is difficult to illustrate without some distortion, especially the shape of the pseudoceps; thus, illustrations may vary slightly from observations of specimens. Larvae are known for less than half the species, and identification is also doubtful. Larvae associated with several species are all very similar, and separation of larvae constitutes a separate project when more are known. Smith (1969) defined larvae of *Susana* and separated them from other tenthredinids.

Acronyms for collections are as follows: ADA, Arizona Department of Agriculture, Phoenix; BEZ, L. Bezark collection, Sacramento, CA; BYU, Brigham Young University, Provo, Utah; CAS, California Academy of Sciences, San Francisco; CDA, California Department of Food and Agriculture, Sacramento; CNC, Canadian National Collection, Ottawa; LACM, Natural History Museum of Los Angeles County, California; NDA, Nevada Department of Agriculture, Reno; ODA, Oregon Department of Agriculture, Salem; UCB, University of California, Berkeley; UK, University of Kansas, Lawrence; USNM, National Museum of Natural History, Smithsonian Institution, Washington, DC. Some of the data from state departments of agriculture were recorded from specimens sent for identification through the Systematic Entomology Laboratory, U. S. Department of Agriculture.

Most distribution records from Smith (1969) are not repeated here.

Key to Species

1. Female 2
– Male 11
2. Mesepisternum with punctures or dull and with irregular sculpturation (Figs. 2–4) 3
– Mesepisternum smooth, shining, without punctures 5
3. Thorax and abdomen black; central serrulae with 2 or 3 large posterior subbasal teeth; first annular tooth above each serrula much larger than serrula; annular teeth large, about 5 on annuli 5 and 6 (Fig. 6) . . . . . *punctata*
– Mesonotum red or red with black on lateral lobes, abdomen black or mostly red with only apex black; legs partly red; central serrulae with 5–7 posterior subbasal teeth; annular tooth above each serrula smaller than serrula; annular teeth small, 8–10 teeth on annuli 5 and 6 (Figs. 5, 7) 4
4. Mesonotum and abdomen except apical segments red; teeth of annuli 2 and 3 indistinct; distances between annuli 1 and 2 and 2 and 3 subequal; apices of serrulae oblique (Fig. 5) . . . . . *cupressi*
– Mesonotum red with lateral lobes mostly black; abdomen black; teeth of annuli 2 and 3 distinct, distance between annuli 1 and 2 shorter than distance between annuli 2 and 3; apices of serrulae truncate (Fig. 7) . . . . . *marin,* n. sp.
5. Basal annuli perpendicular to ventral margin of lancet (Figs. 8–9) 6
– Basal annuli oblique, at a 30°–45° angle to ventral margin of lancet (Figs. 10–13) 8
6. Hind leg black; serrulae of lancet rounded at apices (Fig. 8) (apex of abdomen black); California; on *Cupressus* . . . . . *annulata*
– Hind leg black with femur orange; serrulae of lancet truncated at apices (Fig. 9); British Columbia to California and Utah; on *Juniperus* 7
7. Mesonotum orange with scutellum black; British Columbia . . . . . *fuscala*
– Mesonotum black or with lateral lobes black and prescutum and/or scutellum orange; Oregon, California, Nevada, Utah . . *oregonensis*
8. First annulus of lancet short with 4–5 teeth present only on upper half; annuli with large distinct teeth, 10 or more teeth on annuli 2–6 (Fig. 10); sheath truncate at apex in lateral view (as in Fig. 15) . . . . . *bakeri,* n. sp.
– First annulus present on full width of lancet, with 6 or more teeth; annular teeth small, or less than 10 on annuli 2–6 (Figs. 11–13); sheath in lateral view straight above, rounded below (Fig. 16) 9
9. Lancet with 9 annuli (Fig. 11); forewing with vein 2r absent; abdomen red . . . . . *juniperi*
– Lancet long, with 11 or more annuli (Figs. 12–13); forewing with vein 2r; abdomen red or with black at base and apex 10
10. Femora black; mesonotum orange; abdomen red; apices of serrulae truncate, most with three large posterior subbasal teeth (Fig. 12) . . . . . *rufa*
– Apical halves of femora white to orange; mesonotum orange with anterior half of prescutum and lateral lobes black; abdomen black with orange band on segments 4–6; apices of serrulae pointed, with 4–6 small posterior subbasal teeth (Fig. 13) . . . . . *diablo,* n. sp.
11. Mesepisternum punctate, punctures separated by flat, shining interspaces (Fig. 2) (abdomen orange with basal plates and hypandrium black; hind femur orange; genitalia in Fig. 17) . . . . . *cupressi*
– Mesepisternum smooth and shining, without punctures 12
12. Hind femur orange; abdomen orange or black with central orange band, rarely entirely black; penis valve with lobe adjacent to valvispina usually distinct (Figs. 19–21) 13
– Hind femur black or with orange only at extreme apex; abdomen black with central orange band or entirely black; penis valve with

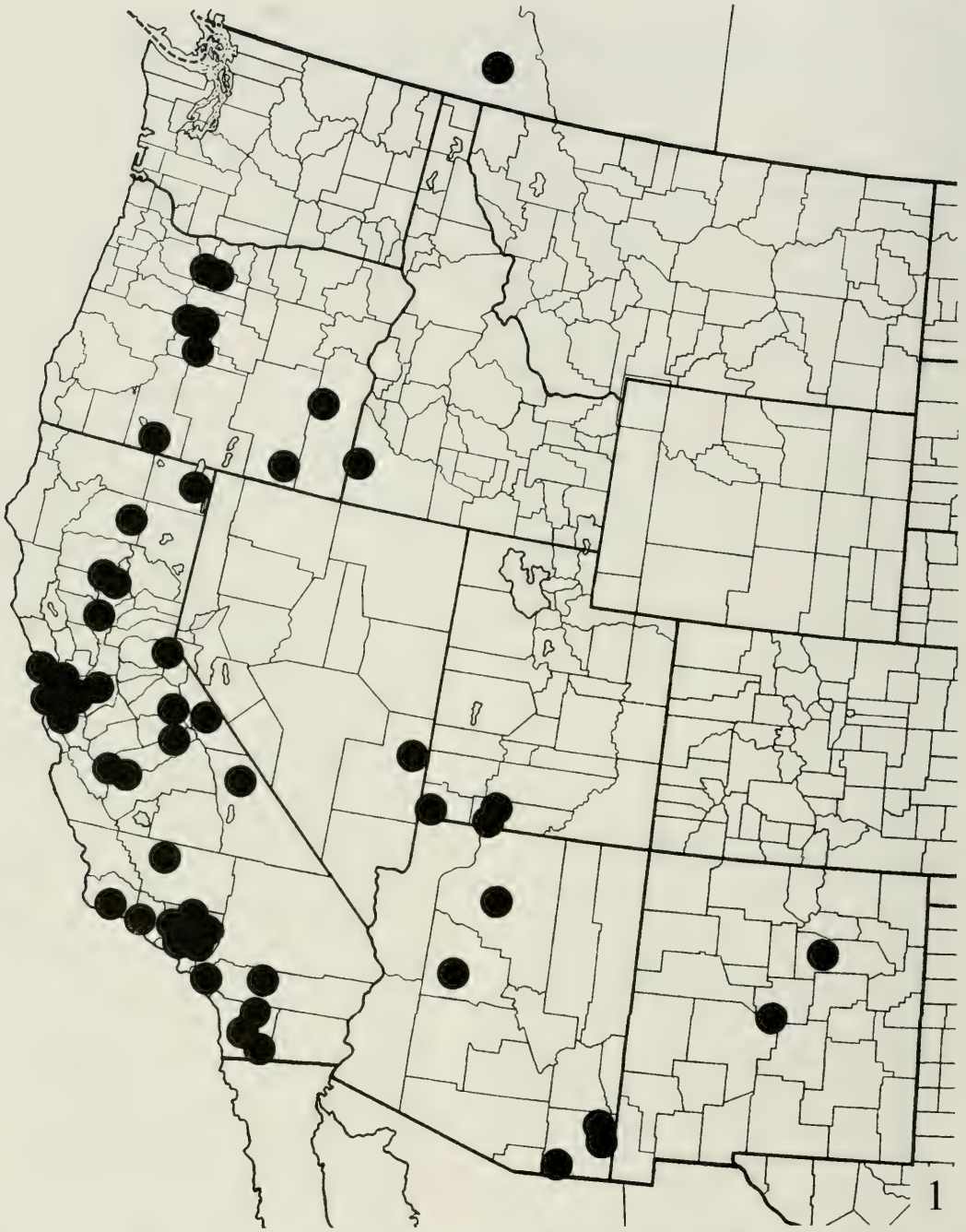
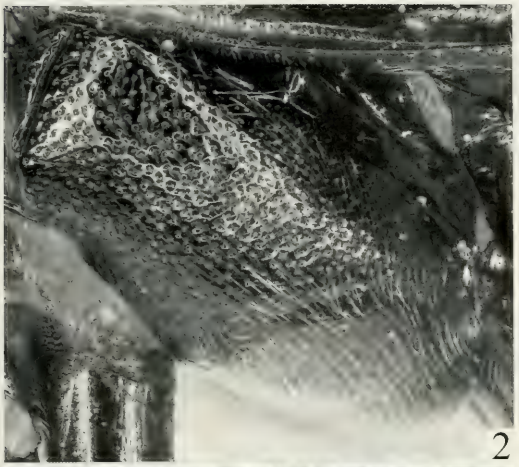
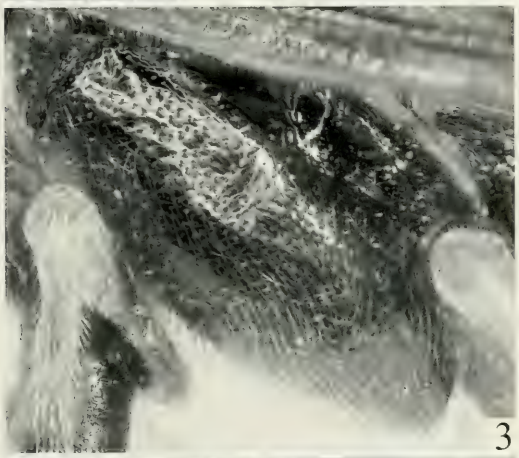


Fig. 1. Collection records of *Susana* spp. Includes all records of identified species, unassociated males, and unassociated larvae.





Figs. 2–4. Mesepisternum. 2, *Susana cupressi.* 3, *S. punctata.* 4, *S. marin.*

lobe adjacent to valvispina small to absent (Figs. 18, 22) 15

13. Abdomen orange, only basal plates black; valvispina of penis valve shorter than half width of valve (Fig. 21) . . . . . *bakeri*
– Abdomen black with segments 3–5 orange; valvispina of penis valve long, equal to or more than half width of valve (Figs. 19–20) 14
14. Penis valve with lobe adjacent of valvispina large, valve somewhat curved (Fig. 19) [this and following species difficult to distinguish] . . . . . *oregonensis*
– Penis valve with lobe adjacent to valvispina small, valve straighter (Fig. 20) . . *diablo*, n. sp.
15. Abdomen orange with terga 1 and 2 and apex black; pale part of legs orange; genitalia as in Fig. 18; California, on *Cupressus* . . . *annulata*
– Abdomen black; tibiae and tarsi white, extreme apex of hind tibia black; Arizona, New Mexico, Utah; on *Juniperus* 16
16. Vein 2r absent in forewing (penis valve in Fig. 22) . . . . . *juniperi*
– Vein 2r present in forewing . . . . . unidentified

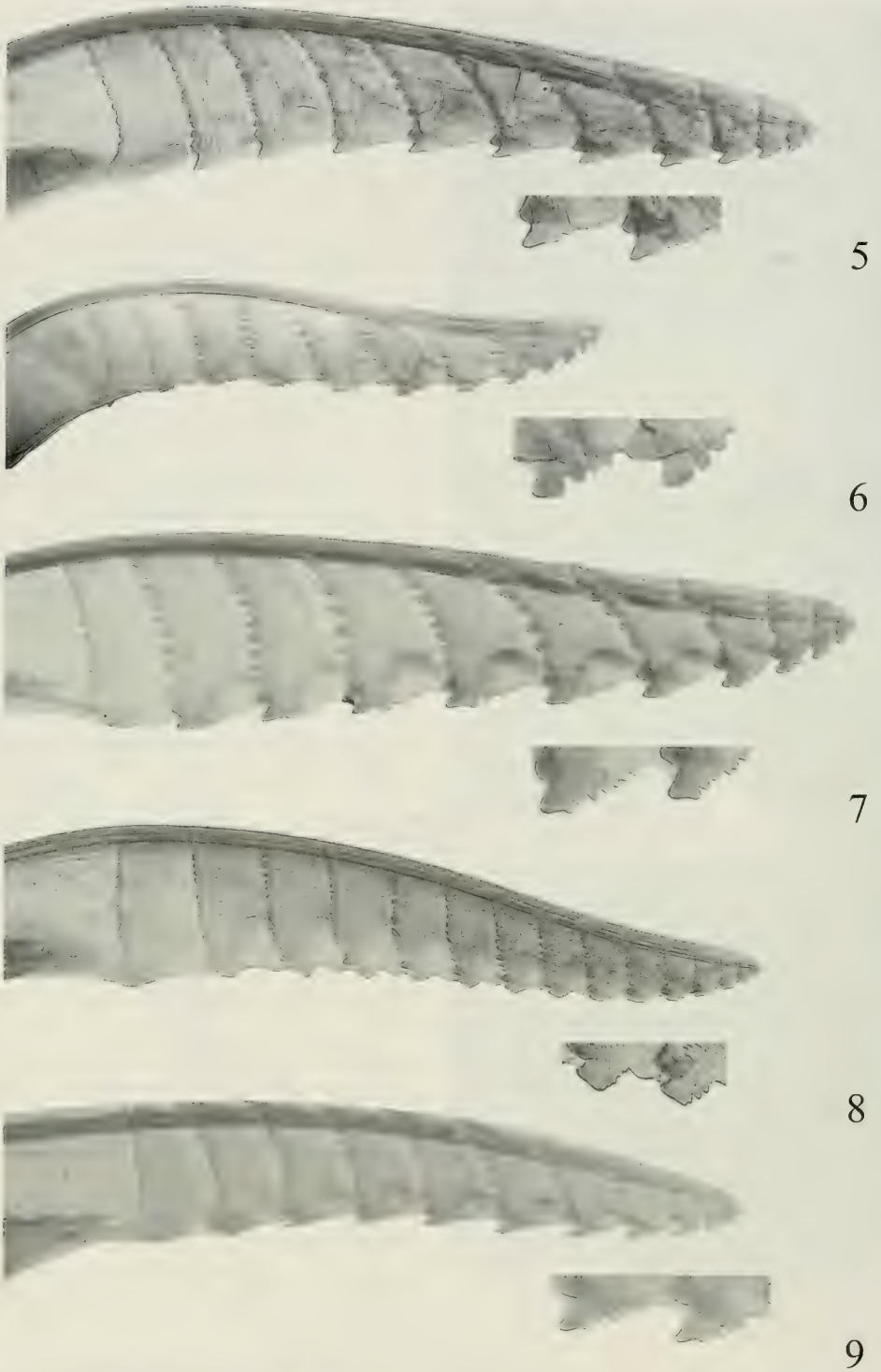
Susana annulata Smith
(Figs. 8, 18)

Susana annulata Smith 1969: 22. ♀, ♂ (Stanford University, Palo Alto, California; USNM).

Diagnosis.—Mesepisternum shining, without punctures. Female with mesonotum rufous with spot laterally on lateral lobes and scutellum black; hind femur black. Sheath in lateral view with apex rounded (as in Fig. 14). Lancet (Fig. 8) with about 13 serrulae; basal annuli perpendicular to ventral margin of lancet; apices of serrulae rounded. Male with abdomen black with segments 3–5 or 6 orange; hind femur black with extreme apex orange; genitalia with long valvispina, without distinct lobe adjacent to valvispina (Fig. 18).

Distribution.—Palo Alto and bay region of California, north to Chico.

Material examined.—CALIFORNIA: Butte Co., Chico Municipal Airport, 39°48′N, 121°52′W, elev. 238′, 25 March 02, 6 April 02, 8 April 02, Coll. by H. R. Jacobson, on Italian cypress (6 ♀, 25 ♂; USNM, CAS); Mill Valley, Marin Co., VI-24-26 (1 ♀; CAS).



Figs. 5–9. Female lancets. 5, *Susana cupressi.* 6, *S. punctata.* 7, *S. marin.* 8, *S. annulata.* 9, *S. oregonensis.* Close up of central serrulae below each lancet.

Food plant.—Smith (1969) recorded an adult collected from *Cupressus macrocarpa*. Adults associated with larvae feeding on Italian cypress, *Cupressus sempervirens* L., Chico, California, by H. R. Jacobson.

Discussion.—Jacobson collected adults of this species on Italian cypress in Chico, California. Later, larvae were present feeding on the same host. This species and *S. cupressi* were feeding on the same group of trees. See discussion of *S. cupressi*.

Susana bakeri Smith, new species
(Figs. 10, 21)

Female.—Length, 8.5 mm. Antenna with scape and pedicel black (flagellum missing). Head black, dark reddish on vertex. Thorax black with extreme posterior margin of pronotum white and central mesepisternum dark orange. Legs black, undersurface of coxae white, extreme apices of femora and extreme bases of tibiae white; hind tibia with black stripe on outer surface and orange on inner surface. Abdomen orange with basal plates and sheath black. Wings hyaline, veins and stigma black.

Mesepisternum smooth, shining, without large punctures. Vein 2r present in forewing. Sheath truncate in lateral view (as in Fig. 15). Lancet (Fig. 10) with basal annuli oblique, not perpendicular to ventral margin of lancet; first annulus incomplete with fine teeth present only on upper half of lancet; serrula with apices pointed, with 2–4 large posterior subbasal teeth; annular teeth large, about 12 or 13 teeth on annuli 3–5.

Male.—Length, 7.0 mm. Head and thorax black. Abdomen orange with basal plates black; legs with femora and tibiae entirely orange. Penis valve (Fig. 21) with valvispina shorter than half width of valve; genital capsule similar to Fig. 18.

Holotype.—Female, labeled "Idaho: Owyhee Co., 9 mi W. Silver City, larvae June 1969, adults Aug. 1969, C. W. Baker" (USNM).

Paratype.—1 ♂, same data as holotype (USNM).

Other specimens.—Larvae labeled "Idaho, Owyhee Co., 9.0 mi W. Silver City (Wagontown), June 20, 1969, on juniper, Charlie W. Baker" (larvae from which adults were reared).

Food plant.—*Juniperus* sp.

Etymology.—Named for my long-time friend and colleague, Dr. Charles W. Baker, retired professor, Boise State University, Boise, Idaho, who collected and reared this species.

Discussion.—It is surprising to find such a distinct species in Owyhee County, Idaho, on the eastern edge of the distribution of *S. oregonensis*. This species is very distinct, and is separated from *S. oregonensis* and other species by the oblique annuli, incomplete first annulus, pointed serrulae, and large posterior subbasal teeth of the female lancet, the very short valvispina of the male genitalia, and the orange abdomen except for the black basal plates of the male.

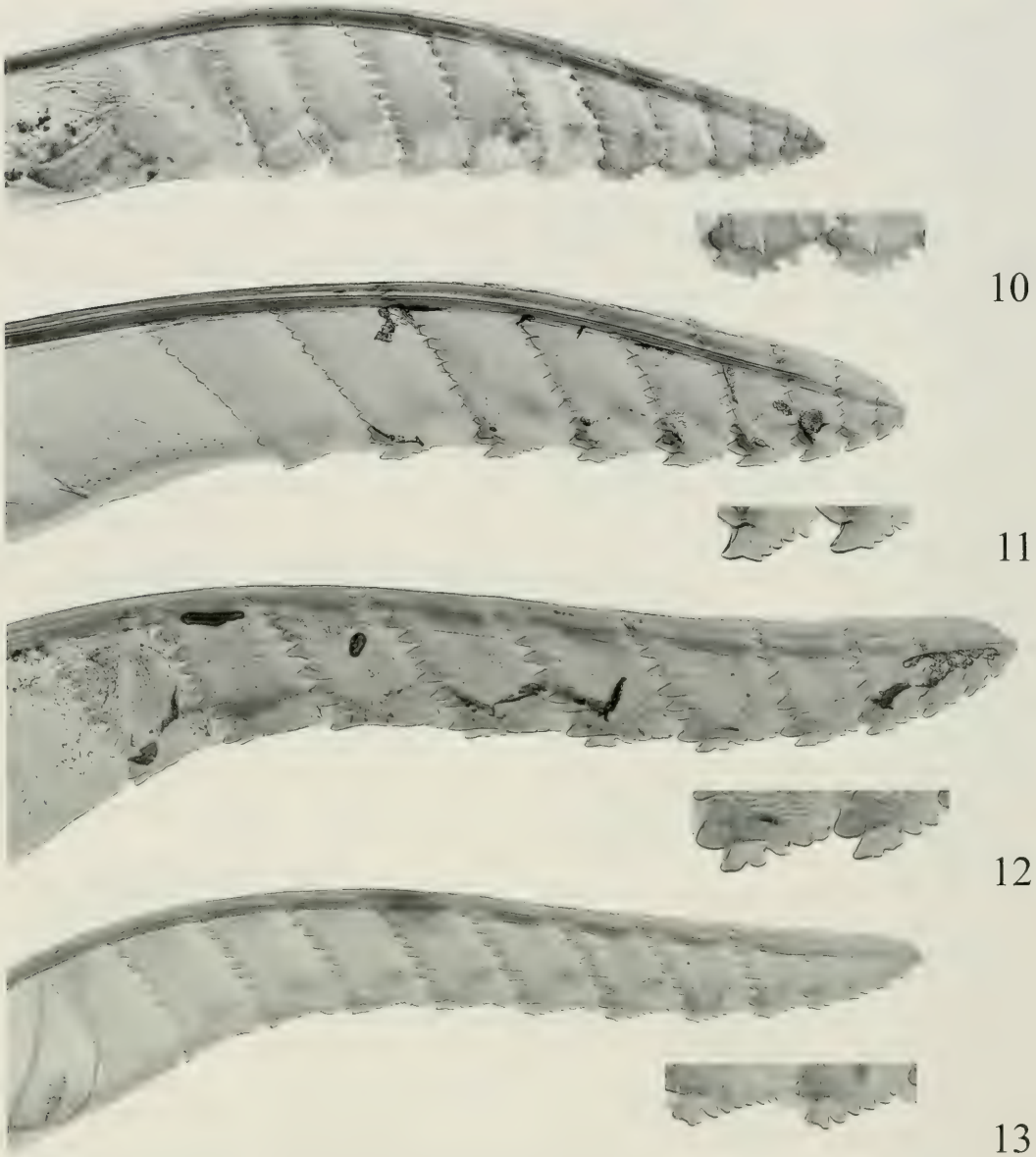
Susana cupressi Rohwer and Middleton
(Figs. 2, 5, 14, 17)

Susana cupressi Rohwer and Middleton 1932: 94. ♀, ♂ (Santa Susana, Ventura Co., California; USNM)

Diagnosis.—Mesepisternum with punctures, punctures separated by flat, shining interspaces (Fig. 2). Mesonotum red; abdomen red with apex black. Sheath in lateral view straight above, rounded below (Fig. 14). Lancet (Fig. 5) with about 11 serrulae; teeth on annuli 1–3 small and indistinct; distance between annuli 1 and 2 subequal to distance between annuli 2 and 3; central serrulae with 3–4 posterior subbasal teeth. Male black, abdomen orange with basal plates and hypandrium black; hind femur orange; genitalia (Fig. 17) with valvispina of penis valve long, without projecting lobe adjacent to valvispina.

Distribution.—Mostly coastal California from Chico south to Los Angeles and Orange counties.

Material examined.—CALIFORNIA: Butte Co., Chico Municipal Airport, 39°48'N, 121°52'W, elev. 238', 17 Feb. 02,



Figs. 10–13. Female lancets. 10, *Susana bakeri,* 11, *S. juniperi.* 12, *S. rufa.* 13, *S. diablo.* Close up of central serrulae below each lancet.

25 Mar. 02, 11 Mar 02, 8 April 02, coll. by H. R. Jacobson, on Italian cypress (38 ♀, 2 ♂; USNM, CAS); Pasadena, 3–18–34, C.D. Michener, on cypress (1 ♀, UK); Roscoe, Los Angeles Co., IV-6–33 (1 ♀, LACM); Long Beach, Los Angeles Co., Feb. 15, 1971 (2 ♀, LACM); Benedict Canyon, Los Angeles Co., March 1971 (1 ♀, LACM); Garden Grove, Orange Co., 3–12–63 (2 ♀, LACM); San Jose, Santa Clara Co., 15 March 1979, collected on juniper, L. G. Bezark (1 ♀, BEZ); Santa Susana, Ventura Co., April 26, 1932, ex cypress hedge (larvae, USNM; probably *S. cupressi*, from type locality but collected one year later).

Food plants.— *Cupressus* spp.; *Cupres-*

sus sempervirens L., Italian cypress. Adults have been collected from Monterey cypress and Arizona cypress, as well as one on juniper.

Discussion.—H. R. Jacobson (personal communication) collected adults of this species on Italian cypress at Chico, California. Adults were numerous on the trees the end of February to the first of April. Larvae appeared later feeding on the cypress. Both this species and *S. annulata* were collected from the same group of five or six Italian cypresses at the Chico Municipal Airport. *Susana annulata* appeared to have a later flight period since adults of that species were collected in late March to early April. Larvae were crawling not only on the cypresses but on the low lying junipers in the same area. Adults were observed on junipers, but none were seen ovipositing on them. Larvae, however, were collected from each plant. The larvae completed feeding by the end of May. Jacobson found larvae and adults only on trees at the Chico Airport. Even though Italian cypress is a common landscape tree in the Chico area, they were never found on the many trees he inspected in the town. At the Chico Airport, the trees were in an open lot, received no water during the hot, dry summers, and the soil was shallow, rocky, and clay.

The other two species with the punctate mesepisternum, *S. punctata* and *S. marin,* have the abdomen black and the thorax mostly black with at most the mesonotal lateral lobes orange. Males of the other two species are not known.

Susana diablo Smith, new species
(Figs. 13, 20)

Female.—Length, 7.0 mm. Antenna and head black. Thorax orange with anterior half of mesoprescutum, mesonotal lateral lobes, mesosternum, and metathorax black. Abdomen orange with terga 1–3 and 7–8 and sheath black. Fore- and midlegs whitish, with trochanters, basal half of femora, and apical tarsal segments black; hind legs black with apical half of femur orange and basal 1/5 of tibia white. Wings hyaline; veins and stigma black.

Mesepisternum smooth, shining, without punctures. Vein 2r present in forewing. Sheath in lateral view straight above, broadly rounded below (as in Fig. 16). Lancet (Fig. 13) with 11 annuli; basal annuli oblique, slanted at about a 30° angle to ventral margin of lancet; apices of serrulae pointed, serrulae with 4–6 small posterior subbasal teeth.

Male.—Length, 6.8 mm. Head and thorax black. Abdomen black with segments 3–5 orange, apical margin of 5th segment black; legs as for female. Penis valve (Fig. 20) nearly straight, valvispina about half width of valve, with small lobe adjacent to valvispina; genital capsule similar to Fig. 18.

Holotype.—Female, labeled "Russelman Pk., Mt. Diablo, Cal., IV-8–38," "Presented by EC Van Dyke Collector," "on juniper" (CAS).

Etymology.—Named from the type locality, a noun in apposition.

Other specimens.— 3 ♂, Same collection data as holotype except IV-8–38 and IV-24–32. Presumably males of this species.

Food plant.—The holotype was collected on juniper.

Discussion.—This species is in the group of species with a smooth, shining mesepisternum and with the basal annuli of the lancet oblique. It is distinguished from *S. bakeri* by the complete first annulus, more posterior subbasal teeth of the serrulae, fewer annular teeth, red parts of the mesonotum, and black apical segments of the abdomen. *Susana juniperi* has black legs and the lancet with only 9 annuli and much finer annular teeth. *Susana rufa* has black legs, the dorsum of the thorax is entirely orange, and only the basal plates of the abdomen are black, and the lancet has larger annular teeth and fewer posterior subbasal teeth on the serrulae. The lancets can be compared in Figs. 10–13. The coloration of the male is similar to *S. oregonensis,* and the male genitalia are very similar, but the lobe ad-

jacent to the valvispina in penis valve of *S. diablo* is low, not as pronounced as that in *S. oregonensis,* and the penis valve is somewhat straighter whereas that of *S. oregonensis* is markedly curved (see Figs. 19–20).

Susana fuscala Wong and Milliron

Susana fuscala Wong and Milliron 1972: 1025, ♀, larva (4 miles north of Invermere Highway Junction, British Columbia; CNC).

Diagnosis.—As for *S. oregonensis*, but mesonotum orange with scutellum black. Female lancet same as *S. oregonensis* (Fig. 9). Male unknown.

Distribution.—Invermere and Dutch Creek regions of British Columbia.

Material examined.—BRITISH COLUMBIA: Paratypes of *S. fuscala*; Dutch Cr., 26-I-52, 6-II-52, 9-II-52, 24-V-52, 7-2-52 (10 ♀; CNC, USNM); Invermere, 26-VII-1957, on *Juniperus scopulorum,* F.I.S. 57-5843-01 (larvae, CNC, USNM), same except 10-VII-1967, F.I.S. 67-6584-01 (larvae, CNC, USNM).

Discussion.—This species is structurally the same as *S. oregonensis* (see lancet of *S. oregonensis,* Fig. 9), separated from it only by the color of the mesonotum. Although the color of the mesonotum of *S. oregonensis* varies considerably, the British Columbia specimens are the only ones I have seen that are orange with the scutellum black. This could be a northern variation of *S. oregonensis,* but because I have not seen possible intermediates between British Columbia and Oregon and have not seen this color pattern in *S. oregonensis* specimens, I prefer to retain *S. fuscala* as a valid species.

Susana juniperi (Rohwer)
(Figs. 11, 22)

Platycampus juniperi Rohwer 1911: 386. ♀. (Las Vegas, New Mexico; USNM).
Susana juniperi: Ross 1937: 82.

Diagnosis.—Mesonotum orange with lateral lobes mostly black; abdomen orange; legs black. Forewing with 2r absent. Sheath in lateral view straight above, rounded below (as in Fig. 16). Lancet (Fig. 11), with 9 annuli; basal annuli oblique, slanted at a 45° angle to ventral margin of lancet; apices of serrulae truncate, with 4 or 5 fine posterior subbasal teeth. Male entirely black with tibiae and tarsi white; penis valve in Fig. 22, with long valvispina and without distinct lobe adjacent to valvispina.

Distribution.—Central New Mexico to southern Utah.

Material examined.—NEW MEXICO: One larva from type locality, Aug. 1901, the adult holotype emerged April 7, 1902 (USNM). UTAH: St. George, V-28–35 (1 ♀, 1 ♂; CAS).

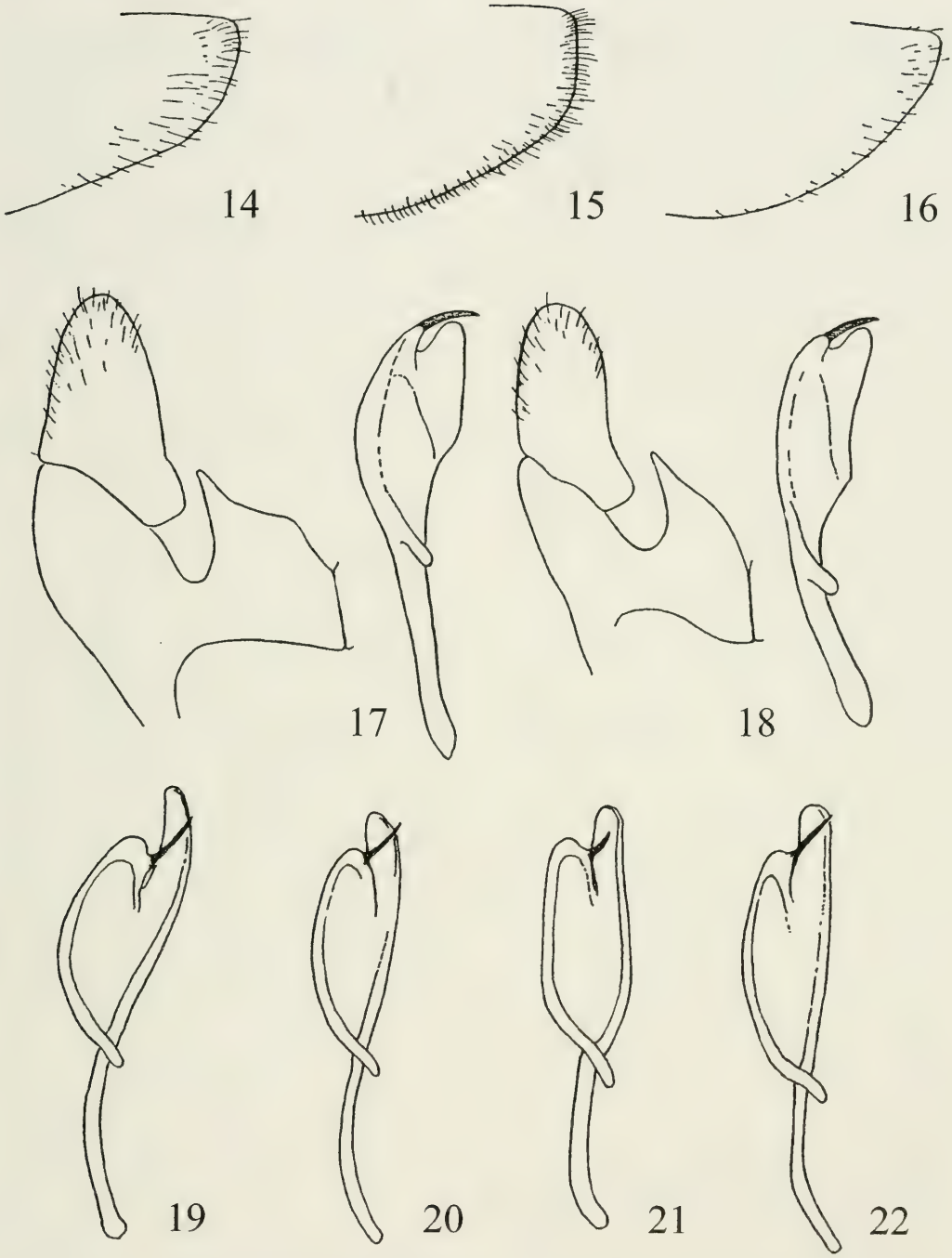
Food plant.—*Juniperus* sp.

Discussion.—Two specimens, a male and female, from St. George, Utah, are the same as the holotype of *S. juniperi.* Though it is possible that the absence of vein 2r in the forewing is an anomaly, both specimens from Utah also lack this vein adding some credibility to this character. In the female from Utah, the lancet is the same as *S. juniperi*, but the mesonotum is entirely red. The lack of vein 2r is the basis for association of the male. Unlike males of other species of *Susana,* it is entirely black with the tibiae and tarsi white.

Another male from the same locality in Utah and the same color as the male associated with *S. juniperi* has vein 2r (as "unassociated" in the preceding key and listed in unassociated males) and is possibly *S. juniperi* or another species. Because that specimen has vein 2r, as do some other similarly colored unassociated males from Arizona and New Mexico, it probably represents the unknown male of another species.

***Susana marin* Smith, new species**
(Figs. 4, 7)

Female.—Length, 7.7 mm. Antenna and head black. Thorax orange with posterior margin of pronotum and mesonotal lateral lobes black. Abdomen black with faint reddish areas on lateral sides of first four seg-



Figs. 14–22. *Susana* spp., sheaths and male genitalia. 14, Female sheath of *S. cupressi.* 15, Female sheath of *S. oregonensis.* 16, Female sheath of *S. rufa.* 17–22, Male genitalia. 17, Ventral view of left half of genital capsule and lateral view of penis valve of *S. cupressi.* 18, Ventral view of left half of genital capsule and penis valve of *S. annulata.* 19, Penis valve of *S. oregonensis.* 20, Penis valve of *S. diablo.* 21, Penis valve of *S. bakeri.* 22, Penis valve of *S. juniperi.*

ments. Legs black with femora, except bases, and extreme base of tibiae orange. Wings hyaline; veins and stigma black.

Mesopleuron with punctures, punctures on central part separated by short interspaces, less than diameter of punctures (Fig. 4) Forewing with vein 2r. Sheath truncate in lateral view (as in Fig. 15). Lancet (Fig. 7) with 11 annuli; teeth on annuli 1–3 distinct; annuli 1 and 2 closer together than annuli 2 and 3; serrulae truncate at apices, central serrulae with 3 or 4 posterior subbasal teeth, apical serrulae with 5–7 small posterior subbasal teeth.

Male.—Unknown.

Holotype.—Female, labeled "Calif: Marin Co., nr. Woodacre, Carson Ridge, 1–22–57," "B. J. Adelson Collector," "Cupressus goveniana" (UCB).

Etymology.—Named from the type locality, a noun in apposition.

Food plant.—The holotype was collected from *Cupressus goveniana* Gordon.

Discussion.—This species is separated from *S. cupressi* and *S. punctata,* the other species with a punctate mesepisternum, by the red mesonotum with the lateral lobes black and the lancet with large annular teeth, with 3–6 large posterior subbasal teeth on the serrulae, and with annuli 2 and 3 farther apart than distance between annuli 1 and 2 (see Figs. 5–7).

Susana oregonensis Smith
(Figs. 9, 15, 19)

Susana oregonensis Smith 1969: 21. ♀. (Klamath Falls, Oregon; USNM).

Diagnosis.—Mesepisternum shining, without punctures. Hind femur orange. Sheath in lateral view truncate at apex (Fig. 15). Lancet (Fig. 9) with about 11 annuli; basal annuli perpendicular to ventral margin of lancet; serrulae truncate at apices, with 4 or 5 posterior subbasal teeth. Male with thorax black; abdomen black with segments 3–5 orange, 5th sometimes black posteriorly; hind femur orange; penis valve (Fig. 19) curved, with long valvispina, as long as half width of valve, and with large protruding lobe adjacent to valvispina.

Distribution.—Oregon east of the Cascade Mountains south to Fresno and Mono counties, California; eastern Nevada and southern Utah.

Material examined.—CALIFORNIA: Cedar Pass, Warner Mtns., Modoc Co., 6 June 1978, collected on Rosaceae, L. G. Bezark (1 ♀, 1 ♂ ; BEZ); Coalinga, III-19–1940 (1 ♀, UK), 3-20-1940 (1 ♀, UK); Lake Eiler, Shasta Co., 9 July 1947 (1 ♀, UK); Occidental, Sonoma Co., V-19–57 (1 ♂, UCB); Sardine Creek, Mono Co., VI-27-57 (1 ♂; UCB); Huntington Lk., Fresno Co., 7,000′ (1 ♂; CAS), July 11,'19; Yosemite Val., VI-27–1921 (1 ♀; CAS); Glen Alqina, Tahoe, June 23, 1929 (1 ♀; CAS); Cedar Ridge, Alameda Co., V-3-31 (1 ♀; CAS); 7 mi W. Hat Creek PO, VII-3-55, *Cupressus macnabiana* (1 ♀, 1 ♂; USNM). NEVADA: Modena Summit, Lincoln Co., V-25–1967, 6,719′, R. C. Bechtel (1 ♀, NDA). OREGON: Redmond, June 1, 1968, K. Goeden, sticky board trap juniper tree (2 ♂, ODA, USNM); 2 mi NNE Simnasho, Wasco Co., 1-VI-68, K. Goeden, sticky board trap juniper tree (2 ♂ ODA); Simnasho, Wasco Co., June 10, 1963, beating juniper, Ken Goeden (larvae, USNM; only species in area and adults collected from same locality); 6 mi W. Juntura, 13-VI-68, K. Goeden, *Juniperus occidentalis* (1 ♂, USNM); 15 mi NW Warm Springs, Wasco Co., June 2, 1968, K. Goeden, sticky board trap juniper tree (1 ♂, ODA); Klamath Falls, VI-16–22 (1 ♀, 1 ♂; CAS) May 13, '24(1 ♀; CAS). UTAH: Mt. Carmel, V-30-35, nr. Zion Cyn (3 ♀, CAS); St. George, V-28–35 (2 ♀, CAS); Kane Co., Grand Staircase—Escalante Nat'l Mon., Seaman Wash, near spring, N. of Hwy 89, 37°07′02″N, 112°14′59″W, 14 May 2001, H. Barber, R. Lorimer, S. E. Morrison (1 ♀, BYU).

Food plants.—*Juniperus occidentalis* Hook. Possibly another species of *Juniperus* in southern Utah. A female and a male

were collected from *Cupressus macnabiana* A. Murray in northern California.

Discussion.—The structures of the female lancet and male genitalia are the most reliable for identification of this species. All specimens have a similar lancet, similar male genitalia, and an orange hind femur. Additionally, the hosts are of species of *Juniperus.*

Coloration of the thorax and abdomen varies throughout its range. In the female, the holotype of *S. oregonensis,* as well as most specimens from eastern Oregon and northern California have the mesoprescutum and mesoscutellum orange, mesonotal lateral lobes black, mesepisternum with a large orange spot, and abdomen mostly orange with the basal plates black and some black on the apical terga. Most specimens from central California, Nevada, and Utah have the mesonotum and mesepisternum entirely black and the abdomen black at the base and apex with a central orange band. A few from eastern Oregon and California have intermediate color varieties between these extremes. The male has a more uniform coloration throughout its range. All specimens have the thorax black and a central orange band on the abdomen. A female from Hat Creek, Shasta Co., California, has the thorax entirely black but a male with the same label data is typical for *S. oregonensis.* The leg coloration remains constant in all specimens.

Susana punctata Smith
(Figs. 3, 6)

Susana punctata Smith 1969: 19. ♀ (7 mi. E. Big Pine, Inyo Co., California; USNM).

Diagnosis.—Mesepisternum with punctures (Fig. 3). Black with tegula, posterior margin of pronotum, apex of each femur, fore- and mid tibiae, basal half on hind tibia, and line on posterior margin of each abdominal segment white. Sheath in lateral view with apex truncate (as in Fig. 15). Lancet (Fig. 6), with 12 annuli; annular teeth large, annuli 5 and 6 with 6 or 7 teeth; serrulae truncate at apices, with 2 large posterior subbasal teeth on central serrulae. Male unknown.

Discussion.—This species still is known only from the holotype.

Susana rufa Smith
(Figs. 12, 16)

Susana rufa Smith 1969: 21. ♀ (5 mi. W. Portal, Chiricahua Mts., Arizona; USNM).

Diagnosis.—Mesepisternum smooth, shining, without punctures. Thorax orange with mesosternum black; abdomen orange; hind femur black. Forewing with vein 2r. Sheath in lateral view straight above, rounded below (Fig. 16). Lancet (Fig. 12) with 11 annuli, basal annuli oblique; apices of serrulae truncate, serrulae with 3 or 4 large posterior subbasal teeth; annular teeth large with only about 6 teeth on annuli 3–6. Male unknown.

Discussion.—This species still is known only by the holotype and one paratype from "N. Mex."

Unassociated Males

Several males were studied that cannot be identified. Because the taxonomy is based on females and males are not known for all species, these may represent males of species known only from females or unknown species. Some, however, represent significant records for the genus, and therefore are recorded here.

ARIZONA: Williams, 27-5, Barber & Schwarz coll. (1 USNM). CALIFORNIA: Mojave Desert, V-1939, R. H. Smith (1, LACM); Jacumba, San Diego Co., IV-25-51 (1, UCB). NEW MEXICO: Torrance Co., Town of Gran Quivira, 9-VIII-65, H. B. Leech (4, CAS). UTAH: St. George (1, CAS).

The specimens from Williams, AZ, Torrance Co., NM, and St. George, UT, are black with the tibiae white, have vein 2r in the forewing and correspond to "unidenti-

fied" in the preceding key. The specimen from Jacumba is similar to *S. oregonensis,* but its distant distribution makes identification questionable.

Larvae

Larvae have been examined from various localities and hosts. Smith (1969) characterized the larvae of *Susana* and described those of *S. cupressi, S. juniperi,* and *S. oregonensis.* Wong and Milliron (1972) described the larva of *S. fuscala.* Since most have not been associated with adults, larvae cannot be identified. The following records, which are not presented in the species treatments, are given because they represent some additional significant food plants and distribution records for the genus.

ARIZONA: Yavapai Co., Prescott,VI-19-73, on Arizona cypress (ADA); Cochise Co., Carr Canyon (1 mi. W. Stat. Hwy 92) near Nicksville, 31-VIII-1991, sweeping *Juniperus* (USNM); Prestcott, Tenopai Co., VI-10-73, on Arizona cypress (USNM); Cochise Co., San Simone, IV-12-72, on Cupressaceae (USNM). CALIFORNIA: Imperial Co., Brawley, larvae on blue Italian Cypress in nursery, 4-11-66 (CDA); Porterville, 4-25-66, larvae on cypress (CDA); San Bernardino Co., Chino, 6-1-67, larvae on Hollywood juniper (CDA); Santa Cruz Co., 6-19-67, on Arizona cypress (CDA); Tulare Co., Visalia, on leaf of arborvitae, *Thuja plicata* (CDA); Stanislaus Co., Empire, 5-6-74, on spruce (CDA); Yuba Co., Marysville, 5-22-03, on Italian cypress (CDA); Santa Barbara Co., Highland, *Juniperus chinensis* "Torulosa," IV-12-1967 (USNM); Woodside, June 2, 1950, Italian cypress (CDA, USNM); San Jose University campus, Santa Clara Co., Sept. 1978, ex cypress (USNM); Riverside, April 29, 1953, on *Juniperus* (USNM); Saticoy, Ventura Co., IV-25-1950, Tecate cypress (USNM); San Diego Co., Escondido, 5-23-1967, cypress (USNM); Pasadena, 5-16-29, on cypress (USNM).

Food Plant Summary

The following list of food plants are from rearing data, larval collections, and data on specimens which may be only adult collection records.

Arborvitae, may refer to a species of *Thuja*; unassociated larvae.

Cupressus arizonicus Greene, Arizona cypress; *Susana cupressi* (adult collection); unassociated larvae.

Cupressus forbesii Jeps., Tecate cypress; unassociated larvae.

Cupressus goveniana Gordon, Gowen cypress; *Susana marin* (adult collection).

Cupressus macnabiana A. Murray, MacNab cypress; *Susana oregonensis* (adult collection).

Cupressus macrocarpa Hertweg, Monterey cypress; *Susana annulata* (adults and larvae); *Susana cupressi* (adults and larvae); unassociated larvae.

Cupressus sempervirens L., Italian cypress; *Susana annulata* (adults and larvae; *Susana cupressi* (adults and larvae), unassociated larvae.

Juniperus chinensis L., Hollywood juniper; unassociated larvae.

Juniperus occidentalis Hook., western juniper; *Susana oregonensis* (adults and larvae).

Juniperus scopulorum Sarg., Rocky Mountain juniper; *Susana fuscala* (rearings).

Thuja plicata Don ex D. Don, western redcedar; unassociated larvae.

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